January 2010

Types S204 and S206 Gas Regulators

WARNING

Fisher® regulators must be installed, operated, and maintained in accordance with federal, state, and local codes, rules and regulations, and Emerson Process Management Regulator Technologies, Inc., instructions.

If the regulator vents gas or a leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Call a gas service person to service the unit. Only a qualified person must install or service the regulator.

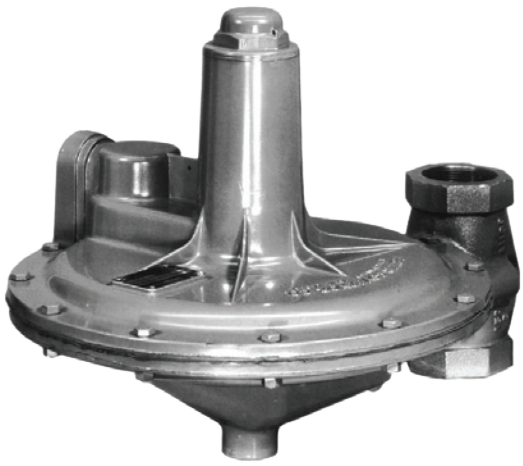

Figure 1. *Typical Type S204 Gas Regulator*

Introduction

Scope of the Manual

This instruction manual provides instructions and a parts list for Types S204 and S206 gas service regulators.

Description

Types S204 and S206 gas service regulators are typically installed on industrial and commercial applications. Both regulators have a low outlet pressure shutoff mechanism that shuts gas flow off if the required minimum outlet pressure cannot be maintained. Type S206 also has an internal relief valve that gives partial downstream overpressure protection.

Specifications

The Specifications table lists the specifications for Types S204 and S206 constructions. The following information is stamped on the regulator at the factory: type number, date of manufacture, spring range, port size, maximum inlet pressure, maximum operating outlet pressure, and outlet pressure which may damage regulator parts.

Installation

WARNING

Personal injury or system damage may result if this regulator is installed, without appropriate overpressure protection, where service conditions could exceed the limits given on the regulator nameplate. Regulator installations should be adequately protected from physical damage.

All vents should be kept open to permit free flow of gas to the atmosphere. Protect openings against entrance of rain, snow, insects, or any other foreign material that may plug the vent or vent line. On outdoor installations, point the spring case vent downward to allow condensate to drain (see Figure 2). This minimizes the possibility of freezing and of water or other foreign materials entering the vent and interfering with proper operation.

D400011X012

Specifications

Body Size and End Connection Style
1-1/2 or 2 NPT inlet and outlet
NPS 2 (DN 50) CL125 FF

Maximum Allowable Inlet Pressure(1)
See Table 1

Maximum Emergency Outlet Pressure(1)
15 psig (1,0 bar)

Seat Ring Diameters
3/8, 1/2, 5/8, 1, and 1-3/16-inches
(9,5; 13; 16; 25; and 30 mm)

Outlet Pressure Ranges
3.5-inches w.c. to 3.25 psig
(9 mbar to 0,22 bar)

Temperature Capabilities(1)
-20° to 150°F (-29° to 66°C)

Pressure Registration
Internal

Approximate Weight
22 pounds (10 kg)

1. The pressure/temperature limits in this Instruction Manual or any applicable standard limitation should not be exceeded.

WARNING

Under enclosed conditions or indoors, escaping gas may accumulate and be an explosion hazard. In these cases, the vent should be piped away from the regulator to the outdoors.

CAUTION

Like most regulators, Types S204 and S206 regulators have an outlet pressure rating lower than their inlet pressure rating. If actual inlet pressure can exceed the outlet pressure rating, outlet overpressure protection is necessary. However, overpressuring any portion of the regulators beyond the limits in Table 1 may cause leakage, damage to the regulator parts, or personal injury due to bursting of pressure-containing parts.

Some type of external overpressure protection should be provided if inlet pressure will be high enough to damage downstream equipment. Common methods of external overpressure protection include relief valves, monitoring regulators, shutoff devices, and series regulators.

If the regulator is exposed to an overpressure condition, it should be inspected for any damage that may have occurred. Regulator operation below these limits does not preclude the possibility of damage from external sources or from debris in the pipeline.

Before installing the regulator, check for damage which might have occurred in shipment. Also, check for dirt or foreign matter which may have accumulated in the regulator body or in the pipeline. Apply pipe compound to the external threads of the pipeline and install the regulator so that flow is in the direction of the arrow cast on the body. The diaphragm casing assembly can be rotated to any position relative to the body. Loosen the two cap screws (key 18, Figure 5) in order to rotate the diaphragm casing assembly.

Do not install the regulator in a location where there can be excessive water accumulation, such as directly beneath a downspout.

If the regulator is used in conjunction with a Type 289H relief valve, it should be installed as shown in Figure 2. The outside end of the vent line should be protected with a rainproof assembly.

The Type 289H should be set 10-inches w.c. (25 mbar) higher than the outlet pressure setting of the regulator, up to 30-inches w.c. (75 mbar) reduced pressure. For pressure greater than this, set the Type 289H 21-inches w.c. (52 mbar) higher than the outlet pressure setting of the regulator.

The Types S204 and S206 regulators have 1 NPT screened vent openings in the spring case. If necessary to vent escaping gas away from the regulator, install a remote vent line in the spring case tapping. Vent piping should be as short and direct as possible with a

Table 1. *Inlet Pressure*

SEAT RING SIZE, INCHES (mm)	INLET PRESSURE SETTING, PSIG (bar)	
	Optimum	Maximum
3/8 (9,5)	100 (6,9)	100 (6,9)
1/2 (13)	75 (5,2)	100 (6,9)
5/8 (16)	60 (4,1)	75 (5,2)
1 (25)	20 (1,4)	30 (2,1)
1-3/16 (30)	7 (0,48)	15 (1,0)

Table 2. *Maximum Outlet Pressure Setting*

DIAPHRAGM PLATES	MAXIMUM OUTLET(1)
Light	30-inches w.c. (75 mbar)
Heavy	3.25 psig (0,22 bar)
1. Maximum emergency outlet (casing) pressure for S200 Series is 15 psig (1,0 bar).	

Table 3. *Spring Chart*

SPRING RANGE, INCHES W.C. (mbar)	PART NUMBER	COLOR CODE
3.5 to 5 (9 to 12)	1D892527022	Brown
5 to 7 (12 to 17)	1D892627022	Red
6.5 to 9.5 (16 to 24)	1D892727012	Black
8.5 to 18 (21 to 45)	1D893227032	Gray
14 to 30 (35 to 75)	1D893327032	Dark Green
1 to 2 psig (69 mbar to 0,14 bar)	1H975827032	Dark Blue
1.5 to 3.25 psig (0,10 to 0,22 bar)	1H975927032	Orange

minimum number of bends and elbows. The remote vent line should have the largest practical diameter. Vent piping on regulators with internal relief (Type S206) must be large enough to vent all relief valve discharge to atmosphere without excessive backpressure and resulting excessive pressure in the regulator.

Periodically check all vent openings to be sure that they are not plugged.

Maximum outlet pressure settings are shown in Table 2. Outlet pressure more than 2 psi (0,14 bar) (light diaphragm plate) or 3 psi (0,21 bar) (heavy diaphragm plate) above the setpoint may damage internal parts such as the diaphragm plate and valve disk. **The maximum emergency (casing) outlet pressure is 15 psig (1,0 bar).**

Startup

CAUTION

Pressure gauges should always be used to monitor downstream pressure during startup. Procedures used in putting this regulator into operation must be planned accordingly if the downstream system is pressurized by another regulator or by a manual bypass.

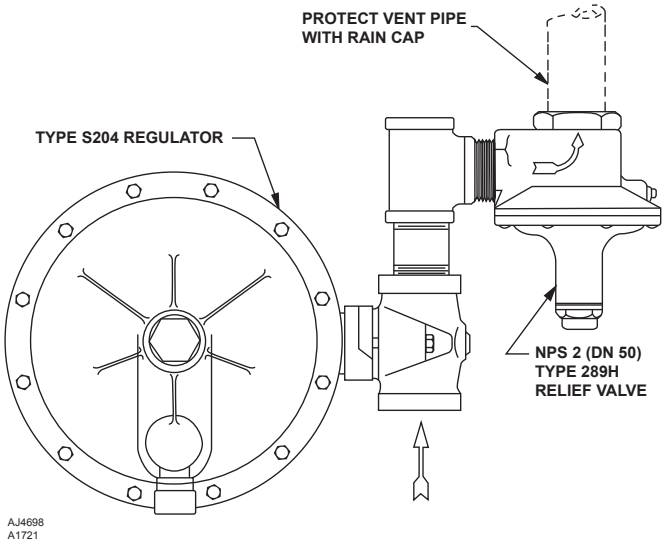

Figure 2. *Type S204 Regulator Installed with the Vent Pointed Downward and with a Type 289H Relief Valve for High Capacity Relief*

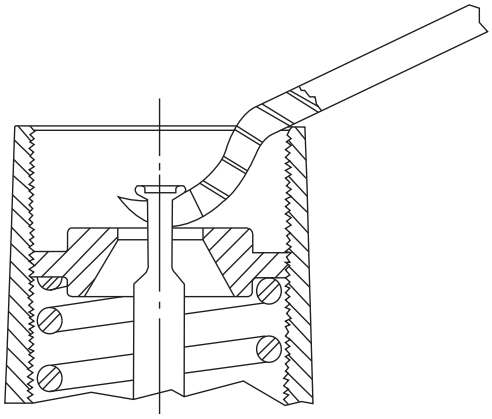

Figure 3. *Reset Lever*

If the downstream system is not pressurized by another regulator or manual bypass valve, use the following procedure to start up the regulator.

1. Slowly open the upstream shutoff valve.
2. The low pressure shutoff mechanism has to be reset. To do this, remove the closing cap (key 4, Figure 5) and pull quickly upward on the reset stem (key 24).

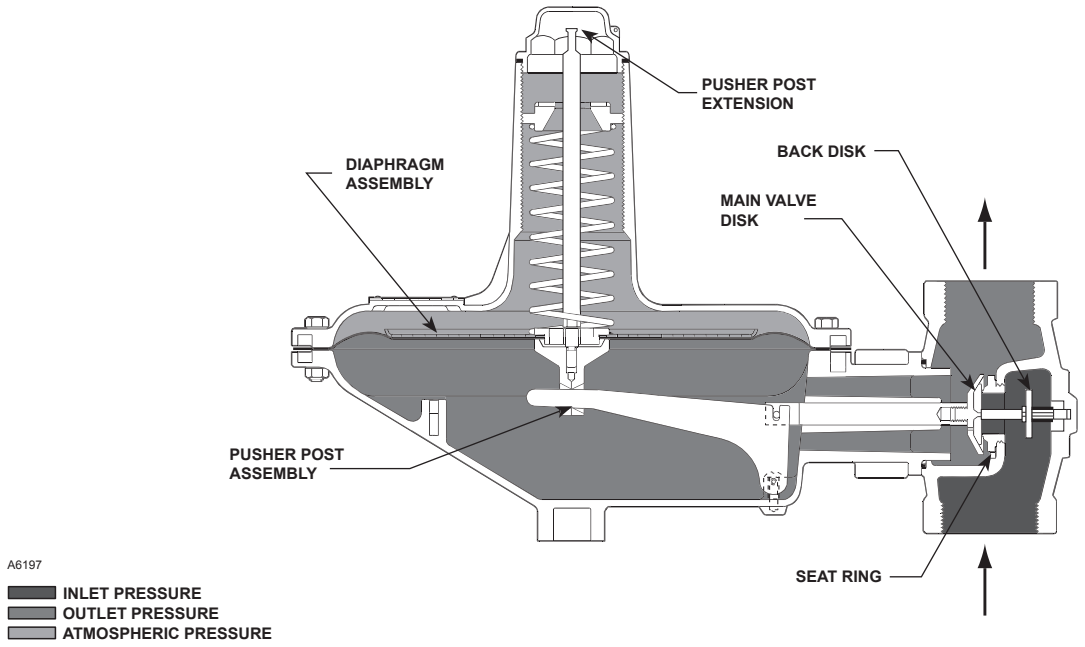

Figure 4. *Operational Schematic*

Note

Follow the same procedure if the regulator shuts off during service. A lever (Part No. ORO6172509A, Figure 3) is needed to reset the regulators when the outlet pressure setting is 7-inches w.c. (17 mbar) or more.

3. Slowly open the downstream shutoff valve.
4. Check all connections for leaks.

Adjustment

The range of allowable pressure settings is stamped on the nameplate. If the required setting is not within this range, substitute the correct spring (as shown in Table 3). If the spring is changed, be sure to change the nameplate to indicate the new pressure range. A pressure gauge should always be used to monitor downstream pressure while adjustments are being made.

1. Remove the closing cap (key 4, Figure 5 or 6).
2. To increase the outlet setting, turn the adjusting screw (key 3) clockwise. To decrease the outlet setting, turn the adjusting screw counterclockwise.
3. Replace the closing cap.

Shutdown

Installation arrangements may vary, but in any installation it is important that the valves be opened or closed slowly and that the outlet pressure be vented before venting inlet pressure to prevent damage caused by reverse pressurization of the regulator. The steps below apply to the typical installation as indicated.

1. Slowly close the upstream shutoff valve.
2. The back disk assembly in the regulator will shut off as inlet pressure drops. Upstream and downstream pressure can then be bled off.

Principle of Operation

Refer to Figure 4. When downstream demand decreases, the pressure under the diaphragm increases. This pressure overcomes the regulator setting (which is set by a spring). Through the action of the pusher post assembly, the valve disk moves closer to the seat ring and reduces gas flow. If demand downstream increases, pressure under the diaphragm decreases. Spring force pushes the pusher post assembly downward, the valve disk moves away from the seat ring, and the gas flow increases.

As downstream pressure drops under high demand, the diaphragm will drop to its lowest position and the main disk will move to its farthest position from

the seat ring. This allows the spring in the back disk assembly to seat the back disk against the seat ring and shut off flow. This condition is maintained until the regulator is manually reset by quickly pulling upward on the pusher post extension in the spring case.

The back disk assembly will also close if inlet pressure drops too low, even if demand is not high.

Maintenance

WARNING

To avoid personal injury or equipment damage, do not attempt any maintenance or disassembly without first isolating the regulator from system pressure and relieving all internal pressure as described in "Shutdown".

Regulators that have been disassembled for repair must be tested for proper operation before being returned to service. Only parts manufactured by Emerson Process Management Regulator Technologies, Inc., should be used for repairing Fisher® regulators. Relight pilot lights according to normal startup procedures.

Due to normal wear or damage that may occur from external sources, this regulator should be inspected and maintained periodically. The frequency of inspection and replacement of parts depends upon the severity of service conditions or the requirements of local, state, and federal rules and regulations.

Disassembly to Replace Diaphragm

Refer to Figure 5 or 6.

1. Remove the closing cap (key 4), and turn the adjusting screw (key 3) counterclockwise to ease spring compression.
2. Remove the adjusting screw and the spring (key 2).
3. Remove hex nuts (key 15) and cap screws (key 14). Separate the upper spring case (key 1) from the lower casing assembly (key 9).
4. Slide the diaphragm and diaphragm plate assembly (key 7) away from the body (key 21) to unhook the pusher post (key 8) from the lever (key 10). Lift off the diaphragm and diaphragm plate assembly.
5. Unscrew the reset stem (key 24) from the pusher post.
6. The diaphragm head can now be lifted off the diaphragm plate assembly.
7. Reassemble the spring case unit in the reverse order of the above steps.

Note

Before tightening the cap screw or stem into the pusher post, place the loosely-assembled diaphragm assembly into position in the lower casing, being sure that the pusher post is hooked on the lever. Rotate the diaphragm so that the diaphragm and lower casing holes are aligned. Tighten cap screw or stem.

Tighten the spring case cap screws finger-tight only. After replacing the spring and adjusting screw, turn the adjusting screw in about half way. This procedure will ensure proper slack in the diaphragm. Finish tightening the cap screws.

Note

Take care not to pinch or tear the diaphragm when reassembling.

Disassembly to Replace Valve Disks and Seat Ring

Refer to Figure 5 or 6.

1. Remove the bolts (key 18) which hold the lower spring casing (key 9) to the body (key 21). Separate the lower spring casing from the body.
2. Check the body O-ring (key 19) for wear.
3. Examine the valve disk (key 16) for nicks, cuts, and other damage. Unscrew the disk holder assembly from the valve stem assembly (key 13) and replace it with a new part if necessary.
4. If the seating edge of the seat ring (key 20) is nicked or rough, remove the seat ring from

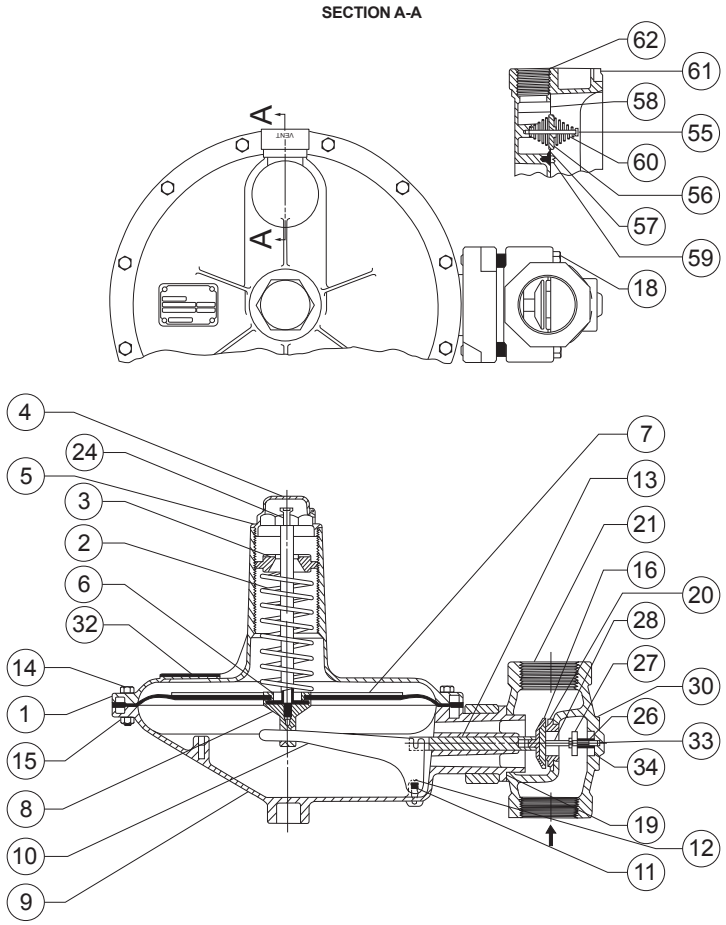

Figure 5. *Type S204 Regulator Assembly*

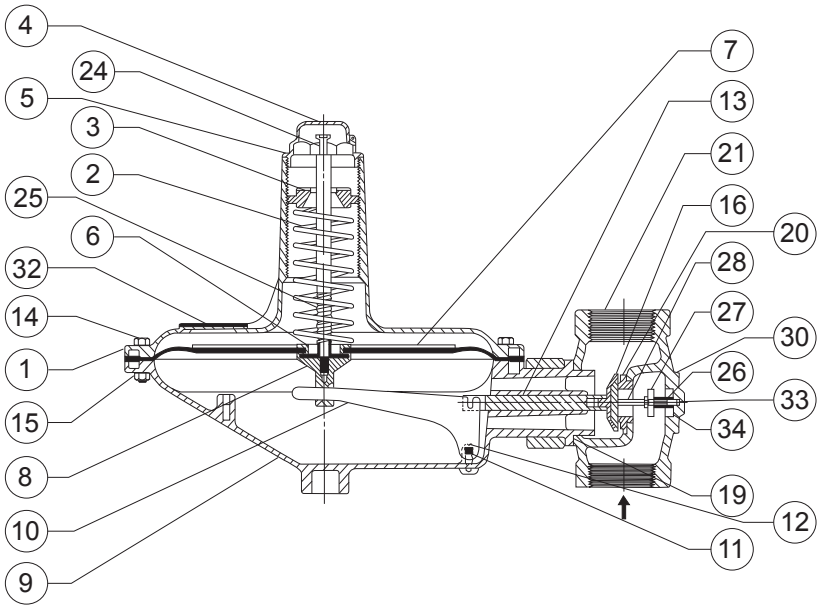

Figure 6. *Type S206 Regulator Assembly*

the body. Change to a new part when reassembling the regulator. (If the seat ring is being replaced with a different sized part, change the nameplate to state the new size and maximum inlet pressure.)

5. Reassemble the regulator in reverse order of the above steps.

6. To inspect the back body disk (key 27), unscrew the body cap (key 20), and the disk assembly can be taken out.

Parts Ordering

The type number, seat ring (port) size, and date of manufacture are stamped on the nameplate. Always provide this information in any correspondence with your local Sales Office regarding replacement parts or technical assistance. If construction changes are made in the field, be sure that the nameplates are also changed to reflect the most recent construction.

Parts List

Key	Description	Part Number
1	Spring Case	
	Aluminum	4L142308032
	Pinned for heavy spring	1J718699022
2	Spring, Steel	See Table 3
3	Adjusting Screw, Aluminum	1L928608012
4	Closing Cap, Aluminum	1L928308012
5*	Closing Cap Gasket, Neoprene (CR)	1N446206992
6	Lower Spring Seat, Aluminum	1L928708012
7	Diaphragm and Head Assembly	
	Use with 1D893327032 and lighter springs	1L1544X0012
	Use with 1H975827032 and heavier springs	1L1545X0012
7A*	Diaphragm, Nitrile (NBR)	
	Use with 1D893327032 and lighter springs	1K978102072
	Use with 1H975827032 and heavier springs	1L154302052
7B	Diaphragm Head, Steel	
	Use with 1D893327032 and lighter springs	1H977928992
	Use with 1H975827032 and heavier springs	1H978025032
8	Pusher Post, Aluminum	
	Type S204 only	2H980608012
9	Lower Casing Assembly,	
	Aluminum	1H9751X0012
10	Lever, Steel	1H974028992
11	Pin, 303 SST	1H972935032
12	Machine Screw, Steel (2 required)	1B420428982
13	Valve Stem Assembly	1H9748000A2
14	Cap Screw, Steel (12 required)	1B136324052
15	Hex Nut, Steel,	
	Cadmium plate (12 required)	1A309324122
16*	Disk Holder Assembly	
	For Natural Gas Service	1P7349000A2
	For Manufactured Gas	
	(5/8-inch (16 mm) and larger Seat Rings)	1J1680X0012
18	Cap Screw, Steel,	
	Cadmium plate (2 required)	1H974724052
19*	O-Ring, Nitrile (NBR)	T12587T0012
20	Seat Ring, Aluminum	
	3/8-inch (9,5 mm) Port Diameter	1U588409022
	1/2-inch (13 mm) Port Diameter	1J718509022
	5/8-inch (16 mm) Port Diameter	1H980509022
	1-inch (25 mm) Port Diameter	1H980709022
	1-3/16-inch (30 mm) Port Diameter	1H980809022
21	Body	
	Cast Iron	
	1-1/2 NPT	1J190519012
	2 NPT	1H974319012
	NPS 2 (DN 50) CL125 FF	
	125 pounds (57 kg)	2K184319012
	Steel	
	1-1/2 NPT	1K788022012
	2 NPT	1K792222012
24	Reset Stem, Steel	
	Type S204	1H980424272
	Type S206	1H969224272
25	Relief Valve Spring, Steel, Cadmium, Plate	
	(Type S206 only)	1H976027012
26	Back Disk Spring	
	302 SST	1A866837022
27*	Back Disk Holder Assembly	1H9739000A2
28	Disk Spacer, Aluminum	
	For Natural Gas Service	1H973609012
	For Manufactured Gas	
	(5/8-inch (16 mm) and larger Seat Rings)	1J168309012
30	Back Body Cap, Aluminum	1R236109022
32	Nameplate, Aluminum	11A5497X032
33	Valve Stem, Aluminum	1H973509082
34	Gasket, Asbestos	1F826804022
55	Flapper Stem, 302 SST	1H976335022
56	Lower Flapper, Nylon (PA)	1H976406992
57	Upper Flapper, Nylon (PA)	1H976506992
58	Seat Ring, 302 SST	T13609T0012
59	Self-Tapping Screw, Steel (3 required)	1H976728982
60	Spring, 302 SST (2 required)	1H976837022
61	Screen, Monel®	1E564843122
62	Snap Ring, 302 SST	1E564937022

*Recommended Spare Parts
Monel® is a mark owned by Special Metals Corporation.

Industrial Regulators

Emerson Process Management
Regulator Technologies, Inc.

USA - Headquarters
McKinney, Texas 75069-1872 USA
Tel: 1-800-558-5853
Outside U.S. 1-972-548-3574

Asia-Pacific
Shanghai, China 201206
Tel: +86 21 2892 9000

Europe
Bologna, Italy 40013
Tel: +39 051 4190611

Middle East and Africa
Dubai, United Arab Emirates
Tel: +971 4811 8100

Natural Gas Technologies

Emerson Process Management
Regulator Technologies, Inc.

USA - Headquarters
McKinney, Texas 75069-1872 USA
Tel: 1-800-558-5853
Outside U.S. 1-972-548-3574

Asia-Pacific
Singapore, Singapore 128461
Tel: +65 6777 8211

Europe
Bologna, Italy 40013
Tel: +39 051 4190611
Gallardon, France 28320
Tel: +33 (0)2 37 33 47 00

TESCOM

Emerson Process Management
Tescom Corporation

USA - Headquarters
Elk River, Minnesota 55330-2445 USA
Tel: 1-763-241-3238

Europe
Selmsdorf, Germany 23923
Tel: +49 (0) 38823 31 0

For further information visit www.fisherregulators.com

The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are the property of their prospective owners. Fisher is a mark owned by Fisher Controls, Inc., a business of Emerson Process Management.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such products at any time without notice.

Emerson Process Management does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any Emerson Process Management product remains solely with the purchaser.

EMERSON™
Process Management

©Emerson Process Management Regulator Technologies, Inc., 1978, 2010; All Rights Reserved